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RESPONSE UNDER 37 C.F.R. § 1.116
EXPEDITED PROCEDURE
GROUP 1713
PATENT APPLICATION

#13
10/29/3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q59785

Hiroshi YAMADA, *et al.*

Appln. No.: 09/695,317

Group Art Unit: 1713

Confirmation No.: 1183

Examiner: Robert D. HARLAN

Filed: October 25, 2000

For: RUBBER COMPOSITION AND TIRE

RESPONSE UNDER 37 C.F.R. § 1.116

MAIL STOP AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Please consider the remarks below in response to the final Action mailed July 24, 2003.

Claims 1-7 and 9-14 are all the claims pending in the application.

Claims 1-7 and 9-14 have been rejected under 35 U.S.C. § 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,380,288 to Hojo, *et al* ("Hojo").

Applicants respectfully traverse the rejection, in view of the following remarks, the attached copy of "Standard Classification System for Carbon Blacks in Rubber Products," and the attached "Additional Table." Specifically, the particularly recited characteristics of the presently claimed carbon black are not inherent to the carbon blacks disclosed in Hojo.

To establish inherency, the missing descriptive matter must necessarily be present in the thing described in the reference, as would be so recognized by those skilled in the art. In re

Robertson, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). Inherency may not be established by probabilities or possibilities.

In the present case, a person of ordinary skill in the art would recognize that the carbon blacks disclosed in Hojo do not necessarily possess the claimed combination of a DBP range of 140-200 ml/100 g and a Dw/Dn ratio range of 1.80 to 2.40.

In Hojo, carbon blacks used as the reinforcing filler are carbon blacks of HAF, ISAF and SAF grades, as set out at column 17, lines 40-41.

HAF, ISAF and SAF are general names of grades of carbon black. However, another more detailed classification of carbon blacks is available. According to ASTM (American Society of Testing and Materials) Standards, HAF corresponds to "N330 class," ISAF corresponds to "N220 class," and SAF corresponds to "N110 class." For the Examiner's convenience, a copy of "Standard Classification System for Carbon Blacks in Rubber Products," which issued in 1990, is attached in order to clarify the classification system for carbon black properties prevailing at the time the invention of Hojo was made.

Furthermore, Applicants kindly request that the Examiner review the attached "Additional Table," which has been prepared in a similar format to that of Table 2 at page 27 of the specification. The characteristics shown in the attached Additional Table are (i) DBP: 140-200 ml/100 g; (ii) Dw/Dn: 1.80-2.40; (iii) Tint; (iv) an equation of Tint $\geqq 0.100 \times N_2SA + 93$; and (v) N_2SA.

The Additional Table shows data for carbon blacks that are representative of the respective classes. For example, in connection with the SAF class, data for five (5) species of carbon black (*i.e.*, N110, N115, N121, N134, and N135) are shown therein.

In contrast, Hojo does not specifically disclose the classes of carbon black. For example, it merely mentions the SAF grade, without specifying the class. Therefore, it is not evident what species of carbon black is referred to by Hojo's disclosure.

The characteristics of carbon black represented by parameters such as DBP and Dw/Dn, as shown in the Additional Table, represent widely known characteristics of carbon black in general. From the data shown in the Additional Table, it is apparent that the carbon black of the present invention differs significantly from carbon blacks of the prior art.

That is, as shown in the Additional Table, the HAF, ISAF and SAF grades of carbon black disclosed in Hojo do not necessarily meet the specific characteristics recited in present Claim 1. While every type of carbon black listed in the Additional Table meets the expression relating to Tint and N_2SA, not one of them meets the claimed DBP range of 140-200 ml/100 g. The data also reveals that only "N299" of the ISAF grade meets the parameter of Dw/Dn.

Incidentally, the carbon black specified in column 41 of Hojo, and identified as "N220" at the bottom of Table 12, is conventionally used carbon black.

Thus, Hojo merely discloses well-known carbon blacks.

In contrast, the carbon blacks of the present invention have an ultra-high structure because they satisfy the DBP parameter of 140-200 ml/100 g.

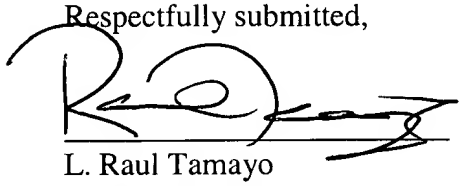
As is apparent from the foregoing, as well as from the remarks presented in the Amendment filed May 27, 2003, the specific characteristics of carbon blacks having an ultra-high structure and a broad aggregate distribution, as disclosed in the present invention, are not inherent to HAF, ISAF and SAF grades of carbon black. Accordingly, the properties of DBP, Dw/DN, and Tint, as claimed in the present invention, are not inherent to the carbon blacks disclosed in Hojo.

For the foregoing reasons, Applicants respectfully request the reconsideration and withdrawal of this §102/§103 rejection of Claims 1-7 and 9-14.

Reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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23373
CUSTOMER NUMBER

Date: October 24, 2003

ADDITIONAL TABLE

	HAF grade		ISAF grade			SAF grade					Present Invention (※ P.I)
	N330	N339	N220	N234	N299	N110	N115	N121	N134	N135	
DBP	102	120	114	125	124	113	113	132	127	135	140-200
Dw/Dn	※—	—	1.30	1.52	1.955	1.44	1.717	1.755	—	—	1.80-2.40
Tint	103	110	115	124	113	124	123	121	132	119	-
※Formula#1	100.9	102.2	104.5	105	103.3	106	107.3	105.4	107.5	107.1	-
N_2SA	79	92	115	120	103	130	143	124	145	141	-
Result	※Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Tint $\geqq 0.100 \times N_2SA + 93$

Notes:

(1) ※ P.I.: a specific range disclosed in the present invention

(2) ※ Formula #1: $0.100 \times N_2SA + 93$

(3) ※ —: no data

(4) ※ Yes: satisfy an equation of Tint $\geqq 0.100 \times N_2SA + 93$

Designation: D 1765 – 90

Standard Classification System for Carbon Blacks Used in Rubber Products[1]

This standard is issued under the fixed designation D 1765; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification system is used to classify rubber grade carbon blacks by the use of a four-character nomenclature system. The first character gives some indication of the influence of the carbon black on the rate of cure of a typical rubber compound containing the black. The second character gives information on the average particle size of the carbon black. The last two characters are assigned arbitrarily.

1.2 All rubber-grade carbon blacks for which a number is currently assigned at the time of publication of this classification system are listed in Table 1 together with some of their typical properties.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D412 Test Methods for Rubber Properties in Tension[2]
D1508 Test Method for Carbon Black, Pelleted—Fines Content[2]
D1510 Test Method for Carbon Black—Iodine Adsorption Number[2]
D1513 Test Method for Carbon Black, Pelleted—Pour Density[2]
D1514 Test Method for Carbon Black—Sieve Residue[2]
D2084 Test Method for Rubber Property—Vulcanization Using Oscillating Disk Cure Meter[2]
D2414 Test Method for Carbon Black—*n*-Dibutyl Phthalate Absorption Number[2]
D3037 Test Methods for Carbon Black—Surface Area by Nitrogen Adsorption[2]
D3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets[2]
D3191 Test Methods for Carbon Black Evaluation in SBR (Styrene-Butadiene Rubber)[2]
D3192 Test Methods for Carbon Black Evaluation in NR (Natural Rubber)[2]
D3265 Test Method for Carbon Black—Tint Strength[2]
D3493 Test Method for Carbon Black—*n*-Dibutyl Phthalate Absorption Number of Compressed Sample[2]
D3765 Test Method for Carbon Black—CTAB (Cetyltrimethylammonium Bromide) Surface Area[2]

3. Basis of Classification

3.1 The first character in the nomenclature system for rubber-grade carbon blacks is a letter indicating the effect of the carbon black on the cure rate of a typical rubber compound containing the black. The letter "N" is used to indicate a normal curing rate typical of furnace blacks that have received no special modification to alter their influence on the rate of cure of rubber. The letter "S" is used for channel blacks or for furnace blacks that have been modified to effectively reduce the curing rate of rubber. Channel blacks characteristically impart a slower rate of cure to rubber compounds. Thus, the letter "S" designates a slow cure rate. Blacks may vary considerably in "curing rate" within each of the two letter classifications.

3.2 The second character in the system is a digit to designate the typical average particle size of the carbon black as determined by electron microscope measurement. The particle size range of rubber-grade carbon blacks has been divided into 10 arbitrary groups, and each group has been assigned a digit to describe that group. These groups are as follows:

Group No.	Typical Average Particle Size, nm
0	1 to 10
1	11 to 19
2	20 to 25
3	26 to 30
4	31 to 39
5	40 to 48
6	49 to 60
7	61 to 100
8	101 to 200
9	201 to 500

3.3 The third and fourth characters in this system are arbitrarily assigned digits.

4. Typical Properties of Carbon Blacks

4.1 Each of the standard grades of carbon black shall have typical physical properties prescribed in Table 1.

4.2 Vulcanizates containing each of the standard grades of carbon black shall have typical physical properties prescribed in Table 1.

4.2.1 The 300 % stress values shown in Table 1 represent the typical differences between the values obtained for the test black and those obtained for Industry Reference Black

[1] This classification is under the jurisdiction of ASTM Committee D-24 on Carbon Black and is the direct responsibility of Subcommittee D24.41 on Carbon Black Nomenclature and Terminology.

Current edition approved April 27, 1990. Published June 1990. Originally published as D 1765 – 65 T. Last previous edition D 1765 – 89a.

[2] *Annual Book of ASTM Standards*, Vol 09.01.

3

TABLE 1 Carbon Black Properties

NOTE 1—The iodine adsorption number and DBP number values represent target values. A target value is defined as an agreed upon value on which producers and their production process and users center their specifications. All other properties shown are averages of typical values supplied by several manufacturers. Typical properties are dependent upon the target values and may vary from producer to producer at the same iodine adsorption and DBP absorption numbers because of the differences in processing equipment.

NOTE 2—IRB data was obtained from tests performed during the certification of IRB No. 8 carbon black.

NOTE 3—The cure rate of vulcanizates containing carbon black compounded by Test Methods D 3192 may be measured by Test Method D 2084.

ASTM Designation	Target Values: Iodine Adsorption No.,[A] D 1510, g/kg	Target Values: DBP No. D 2414, 10^{-5} m³/kg	Typical Descriptive Values: DBP No. Compressed Sample, D 3493, 10^{-5} m³/kg	CTAB, D 3765, 10^{3} m²/kg	Nitrogen Adsorption, D 3037, 10^{3} m²/kg	Tint Strength, D 3265	Pour Density, D 1513, kg/m³ (lb/ft³)	Δ Stress[B] at 300 % Elongation, MPa (psi), cured at 145°C, D 412, D 3182, and D 3192: 30 min
N110	145	113	98	126	149	124	335 (21.0)	0 (0)
N115	160	113	95	128	145	123	345 (21.5)	−0.2 (−30)
N121	121	132	112	121	132	121	320 (20.0)	+3.3 (+480)
N125	117	104	89	126	132	123	370 (23.0)	+0.6 (+90)
S212	...	85	82	119	117	115	400 (25.0)	−3.3 (−480)
N220	121	114	100	111	119	115	345 (21.5)	+0.9 (+130)
N231	121	92	88	106	117	117	390 (24.5)	−1.4 (−200)
N234	120	125	100	119	126	124	320 (20.0)	+2.3 (+340)
N242	121	121	100	110	115	115	330 (20.5)	+2.7 (+390)
N293	145	100	92	114	130	117	375 (23.5)	−1.6 (−230)
N299	108	124	105	104	108	113	685 (21.0)	+3.3 (+480)
S315	...	79	75	95	88	...	450 (28.0)	−3.2 (−460)
N326	82	72	69	83	84	112	465 (29.0)	−1.7 (−240)
N330	82	102	88	82	83	103	375 (23.5)	+1.7 (+250)
N332	85	101	91	90	90	116	375 (23.5)	+2.5 (+360)
N339	90	120	101	93	96	110	345 (21.5)	+3.4 (+500)
N343	92	130	104	95	97	114	336 (21.0)	+5.2 (+750)
N347	90	124	100	87	90	109	335 (21.0)	+3.1 (+450)
N351	68	120	97	73	73	100	345 (21.5)	+3.7 (+540)
N358	84	150	112	88	87	99	290 (18.0)	+5.4 (+780)
N375	90	114	97	95	100	115	345 (21.5)	+2.9 (+420)
N472	250	178	114	145	270	...	255 (16.0)	−1.8 (−260)
N539	43	111	84	41	41	...	385 (24.0)	+1.4 (+200)
N550	43	121	86	42	42	...	360 (22.5)	+1.7 (+250)
N582	100	160	114	76	80	97	190 (12.0)	+1.9 (+166)
N630	36	78	62	35	36	...	465 (29.0)	−1.2 (−180)
N642	36	64	62	34	37	...	513 (32.0)	−2.3 (−330)
N650	36	122	87	36	36	...	370 (23.0)	+1.7 (+250)
N660	36	90	75	36	35	...	425 (26.5)	−0.1 (−20)
N683	35	133	...	39	37	...	335 (21.0)	+2.3 (+340)
N754	24	58	57	29	...	...	495 (31.0)	−3.5 (−510)
N762	27	65	57	29	28	...	505 (31.5)	−2.6 (−370)
N765	31	115	88	33	31	...	375 (23.5)	+1.2 (+180)
N772	30	65	58	33	32	...	505 (31.5)	−2.6 (−370)
N774	29	72	62	29	29	...	495 (31.0)	−1.4 (−200)
N787	30	60	74	31	30	...	450 (28.0)	−1.0 (−150)
N907	...	34	...	...	11	...	...	−6.2 (−900)
N908	...	34	...	...	...	...	...	−7.0 (−1020)
N990	...	43	40	9	9	...	...	−5.5 (−800)
N991	...	35	38	8	7	...	...	−7.0 (−1020)

[A] In general, Test Method D 1510 can be used to estimate the surface area of furnace blacks but not channel, oxidized, and thermal blacks.
[B] Δ Stress = stress at 300 % elongation of test black − stress at 300 % elongation of IRB No. 6.
[C] Stress at 300 % elongation MPa (psi) cured at 145°C for 50 min. (Difference from IRB No. 6.)
S212: −3.4 (−480)
S315: −3.4 (−480)

No. 6. In practice, the black compounds shall be mixed and tested at the same time using the formulation in Test Methods D 3192.

NOTE 1—Industry Reference Black No. 6[3] is an N330 type black prepared at one location[4] and physically blended to obtain uniformity. A large volume (409 000 kg (900 000 lb)) of this black was prepared since it is used daily by carbon black producers. It is used as a standard black by the manufacturers in preference to the National Institute of Standards and Technology (NIST) Standard Sample No. 378 because of this usage rate. The black has an iodine number of 80.0 and DBP number of 100.0.

NOTE 2—For comparison of IRB No. 5 to IRB No. 6 per SBR-1502 see Table 2.

4.3 The properties enumerated shall be determined in accordance with the ASTM test methods shown in Table 1.

4.4 The following carbon black properties are not included in Table 1 but do have previously established maximum values.

4.4.1 *Sieve Residue*—Test Method D 1514. Screen size

[3] Supporting data are available from ASTM Headquarters. Request RR: D24-1005.

[4] Available in the USA from the J. M. Huber Customer Service Dept., P.O. Box 2831, Borger, TX 79008-2831.

TABLE 2 Comparison of IRB No. 5 to IRB No. 6 in SBR-1500 (Test Methods D 412 and D 3191 and Practice D 3182), MPa (psi)

	IRB No. 5	IRB No. 6	Δ
35' stress at 300 % elongation	16.2 (2350)	13.6 (1975)	−2.6 (−375)
35' tensile strength	27.5 (3990)	26.0 (3770)	−1.5 (−220)
60' stress at 300 % elongation	18.8 (2640)	16.9 (2450)	−2.7 (−390)
60' tensile strength	28.3 (4105)	27.1 (3930)	−1.2 (−175)

500 μm (No. 35), maximum 0.0010 %, and 45 μm (No. 325), maximum 0.10 % for all grades.

4.4.2 *Fines*—Test Method D 1508. Screen size 125 μm (No. 120). Maximum 7 % fines on bulk units for all grades except thermal blacks. The 5-min fines test shall be used, and samples shall be taken from sample ports.

4.5 The values shown in Table 1 are often an average of typical values from the various suppliers of a particular grade of carbon black.

5. Procedures for Classifying a New Carbon Black

5.1 Data for classification of a new grade of carbon black are to be submitted to ASTM Headquarters, to the attention of the chairman of Subcommittee D24.41 on Carbon Black Nomenclature and Terminology.

5.2 Data to be submitted shall consist of typical values for the following:

Property	Test Procedure
Particle size	
CTAB	D 3765
Nitrogen adsorption	D 3037
DBP absorption number, compressed sample	D 3493
Tint strength	D 3265
Pour density	D 1513
Stress at 300 % Elongation, 30 ft	D 3192

and target values for the following properties:

Property	Test Procedure
Iodine number	D 1510
DBP absorption number	D 2414

5.3 When the chairman of Subcommittee D24.41 receives a request to assign a classification number to a new carbon black, the following action is taken:

5.3.1 Confirmation that the new carbon meets the scope of Committee D-24.

5.3.2 Confirmation that the new carbon is commercially available.

5.3.3 Establishment of the "*N*" or "*S*" first character assignment and the second character (number) assignment based upon the data submitted with the request.

5.3.4 Establishment of the third and fourth character (number) assignments based upon the information from the requestor. Without specific information from the requestor, these characters are arbitrarily assigned by the chairman of Subcommittee D 24.41.

5.4 A simultaneous subcommittee and committee ballot is conducted to add the black to Table 1 as a standard grade. If no negative votes are cast, the subcommittee chairman will inform all members of the committee of the acceptance of the new black and the designation assigned to it. Final approval will be conferred by the Society's Committee on Standards after a Society ballot. If any negative votes are cast, the application will be discussed at the next meeting of the subcommittee.

ANNEX

(Mandatory Information)

A1. LISTING OF THE PROPERTIES OF INDUSTRY REFERENCE BLACKS

A1.1 The listing of properties for Industry Reference Blacks (IRBs) is given in Table A1.1. This spans a period of 20 years. The absolute values for I_2 number, DBP number, DBP CS number, and tint strength are listed. Values for tensile stress at 300 % elongation or "modulus" and tensile strength are given in relation to the previous IRB as a "difference." All of these represent average values as determined by testing programs carried out prior to the dates listed for each reference black. Since the purpose of an Industry Reference Black is the elimination of the major part of laboratory-to-laboratory variation, it is used as a reference material within each laboratory to correct actual measured property values in that laboratory.

A1.2 The user of this table is cautioned against attempting to add the differences listed in the modulus and tensile strength columns to determine the relationship of two carbon blacks not adjacent in time. Such an addition is likely to produce spurious results due to additive errors.

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